Experiment No.:08

Name of the Experiment: Experimental Study of Inverter (DC-AC) in MATLAB Simulink

Objectives:

- To Learn Inverter Circuits and Convert DC to AC
- To Implement Inverter Circuits in Simulink and Observe the Output in Scope

Software Package:

- MATLAB
- Simulink

H-Bridge Circuit with RL Load (PWM):

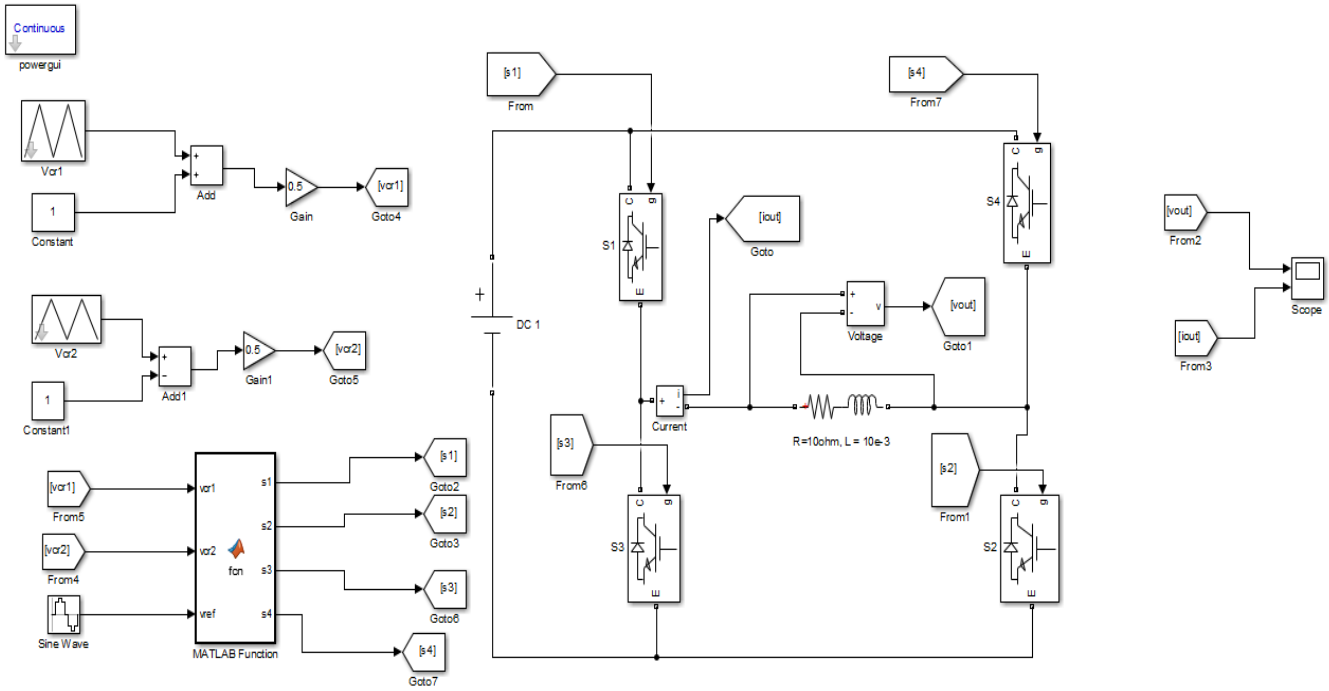

Figure 8.1.: H-Bridge DC-AC Converter Circuit in Simulink With RL Load Where R = 10 ohm and L = 10e-3H

MATLAB CODE:

```
function [s1,s2,s3,s4] = fcn(vcr1,vcr2,vref)
% positive half Cycle
if vref>0
    s2 = 0;s1=0;
```

```
    if vref>vcr1
        s3 = 1;
        s4 = 1;
    else
        s3 = 0;
        s4 = 1;
    end
% Negative half Cycle
else
    s3 = 0; s4 = 0;
    if abs(vref)>abs(vcr2)
        s2 = 1;
        s1 = 1;
    else
        s2 = 0;
        s1 = 1;
    end
end
```

Output:

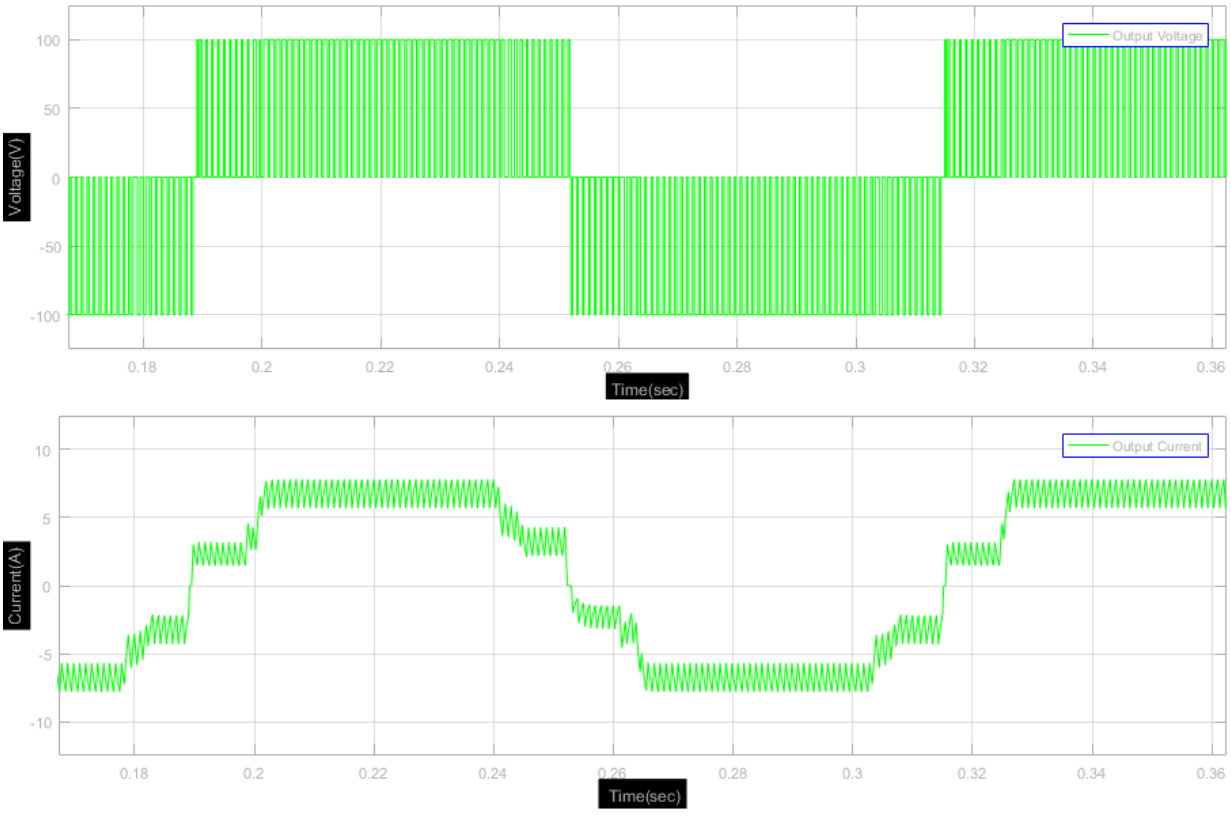

Figure 8.2.: Load Voltage and Current Waveform of H-Bridge Circuit with RL Load in Simulink where R = 10ohm and L = 10e-3H

H-Bridge Circuit with R Load:

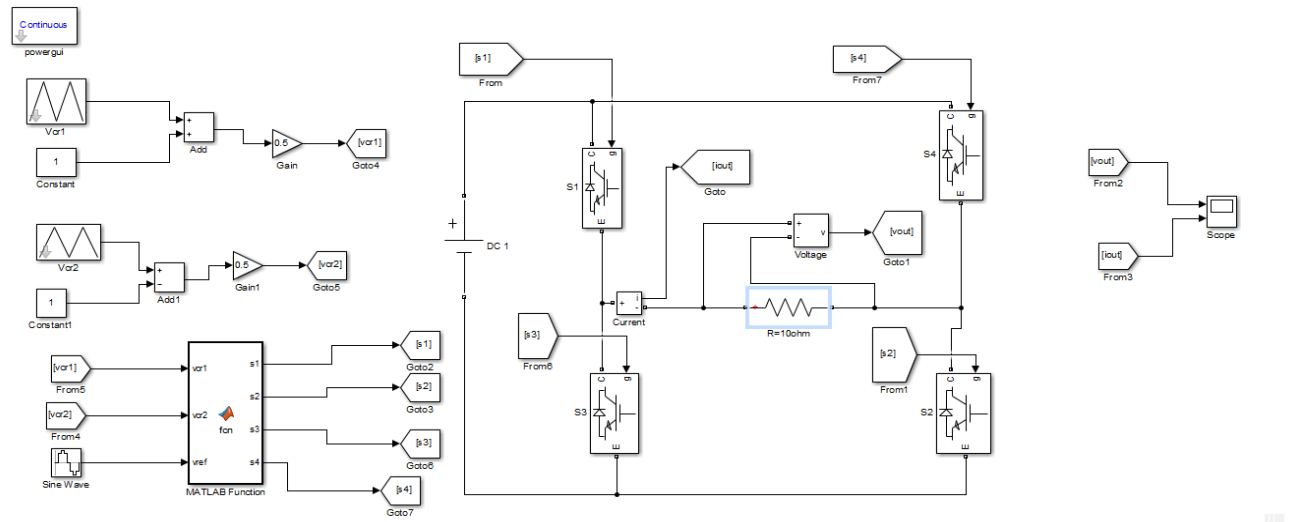

Figure 8.3.: H-Bridge DC-AC Converter Circuit in Simulink with R Load Where R = 10 ohm

Output:

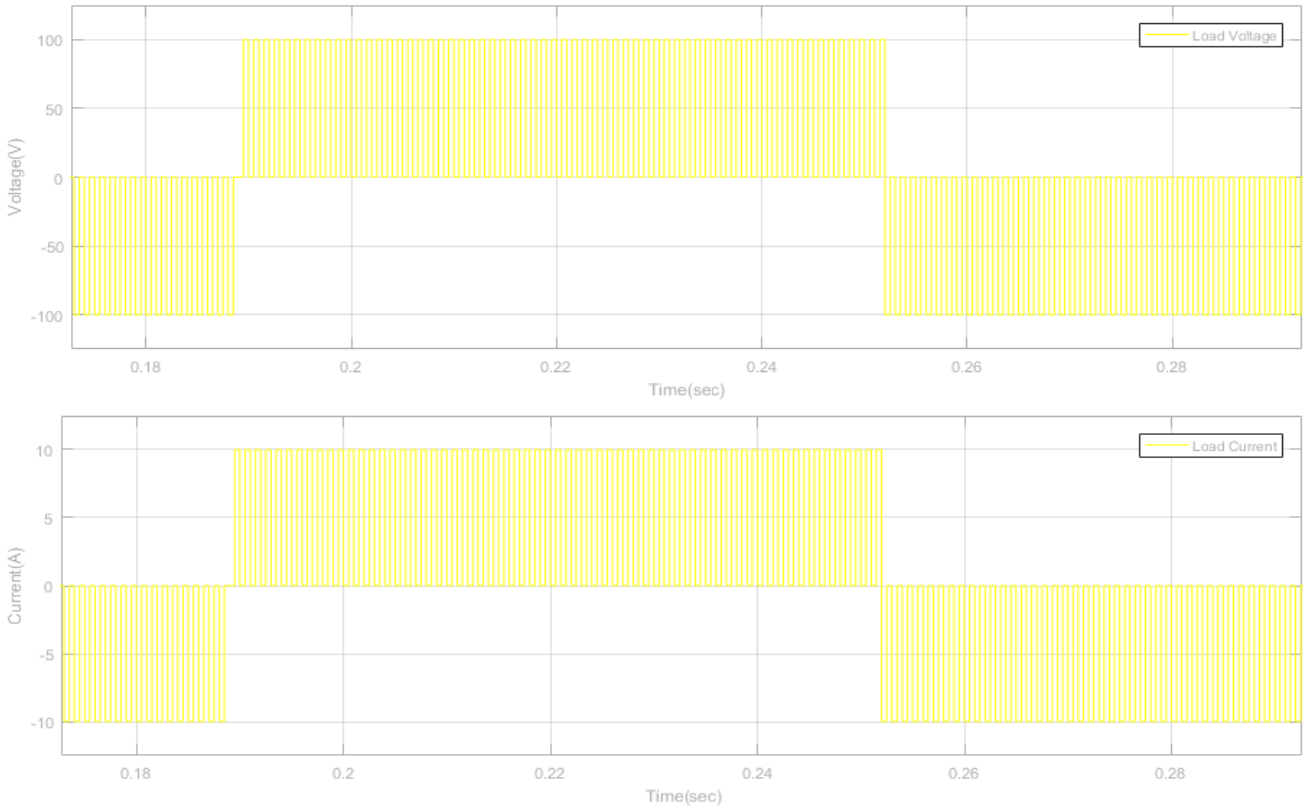

Figure 8.4.: Load Voltage and Current Waveform of H-Bridge Circuit with R Load in Simulink where R = 10ohm

Half-Bridge Inverter Circuit:

Circuit -1:

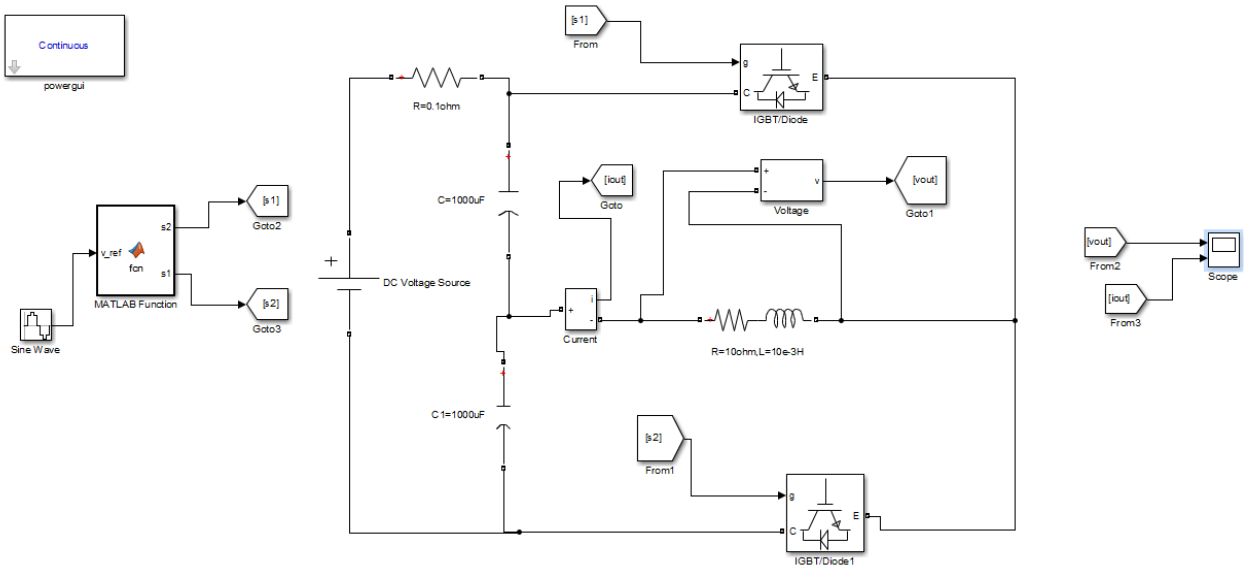

Figure 8.5.: Half – Bridge Inverter Circuit with RL Load where R = 10ohm and L = 10e-3H

Output:

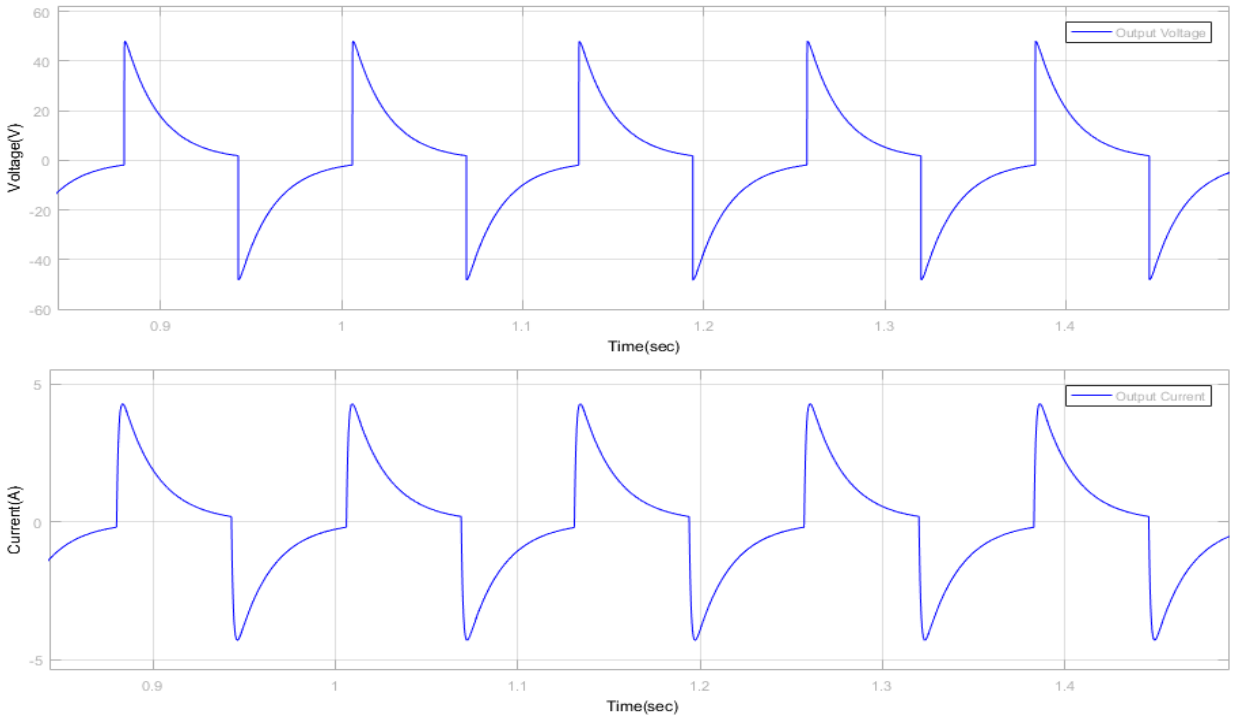

Figure 8.6.: Load Voltage and Current Waveform of Half-Bridge Inverter in Simulink where R = 10 ohm and L = 10e-3H

MATLAB CODE:

```
function [s2,s1] = fcn(v_ref)
if v_ref > 0
    s2 = 0;
    s1 = 1;
else
    s2 = 1;
    s1 = 0;
end
```

Circuit-2:

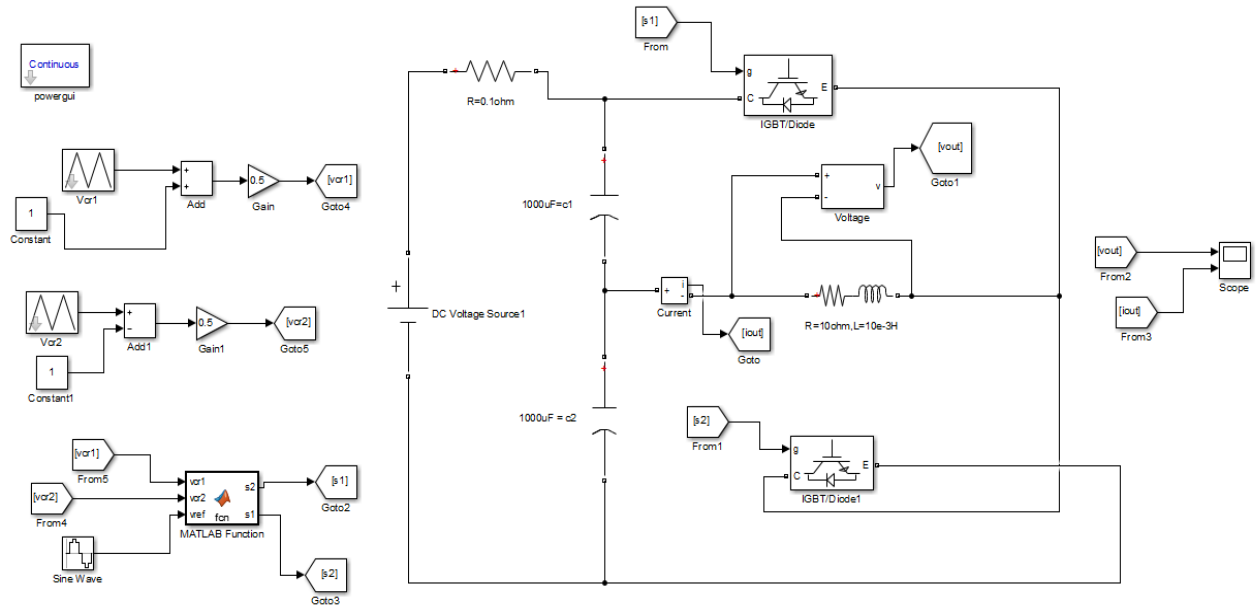

Figure 8.7.: Half – Bridge Inverter Circuit with RL Load where R = 10ohm and L = 10e-3H

MATLAB CODE:

```
function [s2,s1] = fcn(vcr1,vcr2,vref)
% positive half Cycle
if vref>0
    s2 = 0;
    if vref>vcr1
        s1 = 1;
    else
        s1 = 0;
    end
% Negative half Cycle
else
    s1 = 0;
    if abs(vref)>abs(vcr2)
        s2 = 1;
    else
        s2 = 0;
    end
end
```

Output:

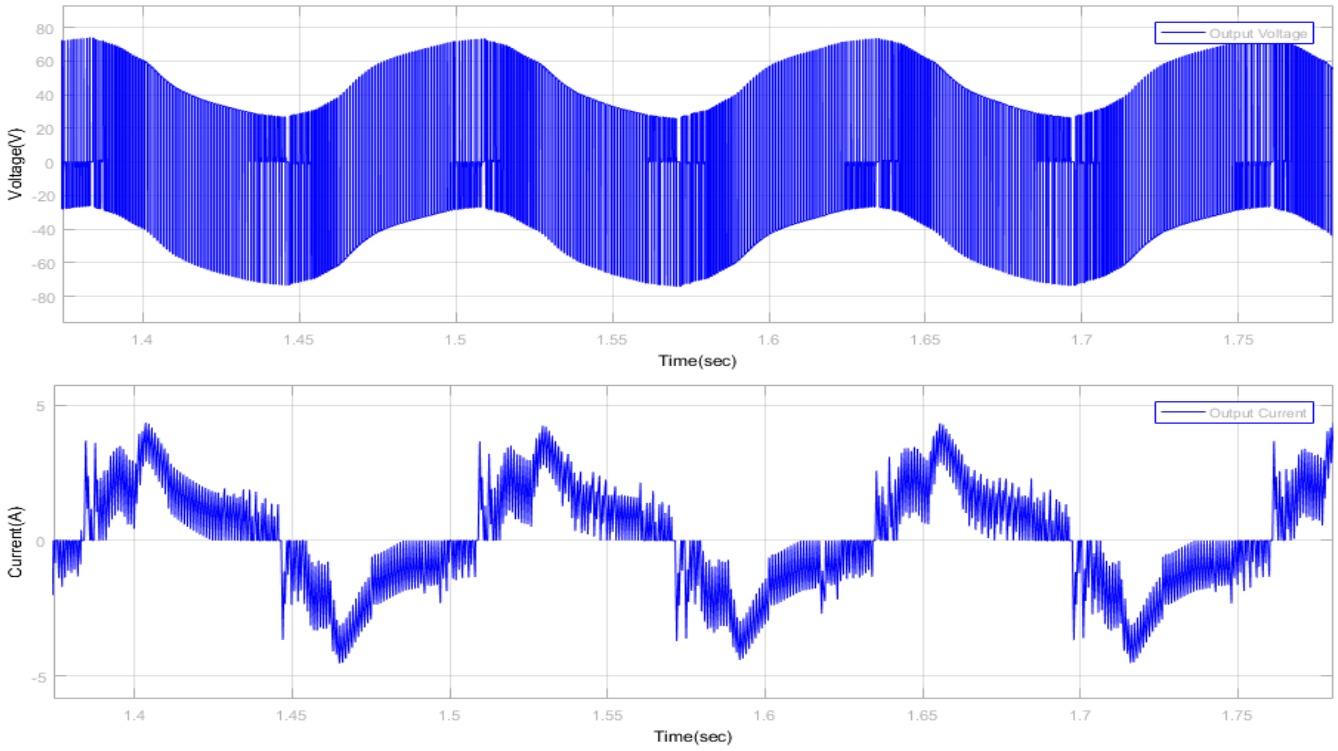

Figure 8.8.: Load Voltage and Current Waveform of Half-Bridge Inverter in Simulink where R = 10 ohm and L = 10e-3H

Circuit-3:

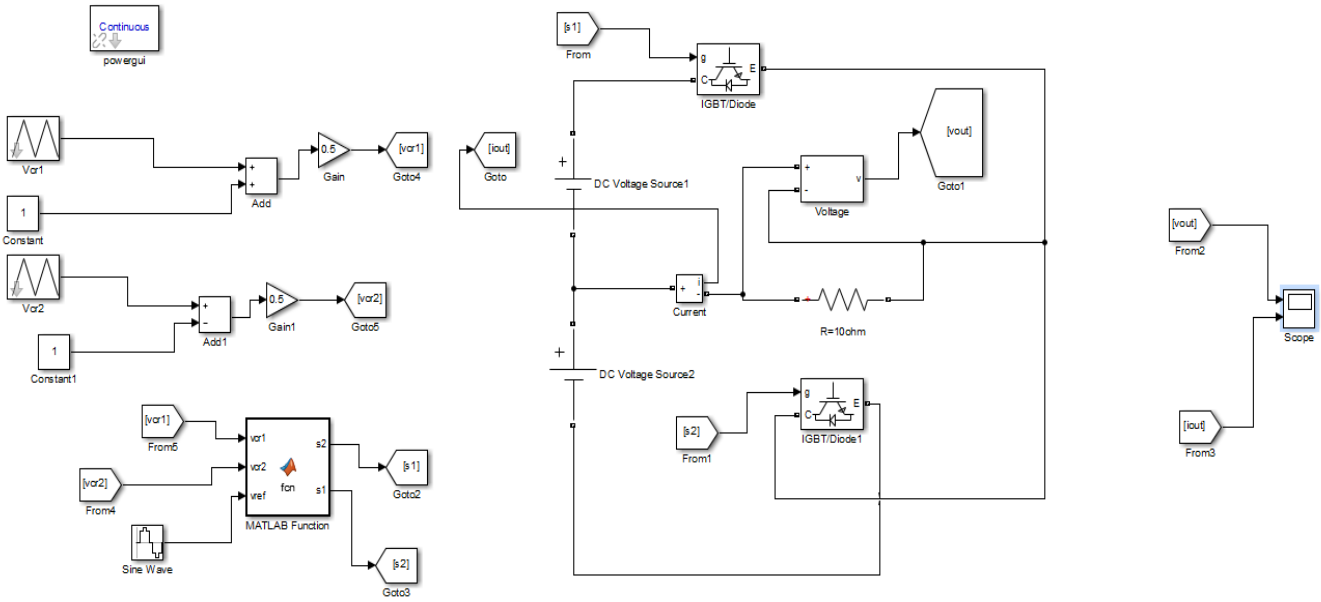

Figure 8.9.: Half – Bridge Inverter Circuit with R Load where R = 10ohm

MATLAB CODE:

```
function [s2,s1] = fcn(vcr1,vcr2,vref)
% positive half Cycle
if vref>0
    s2 = 0;
    if vref>vcr1
        s1 = 1;
    else
        s1 = 0;
    end
% Negative half Cycle
else
    s1 = 0;
    if abs(vref)>abs(vcr2)
        s2 = 1;
    else
        s2 = 0;
    end
end
```

Output:

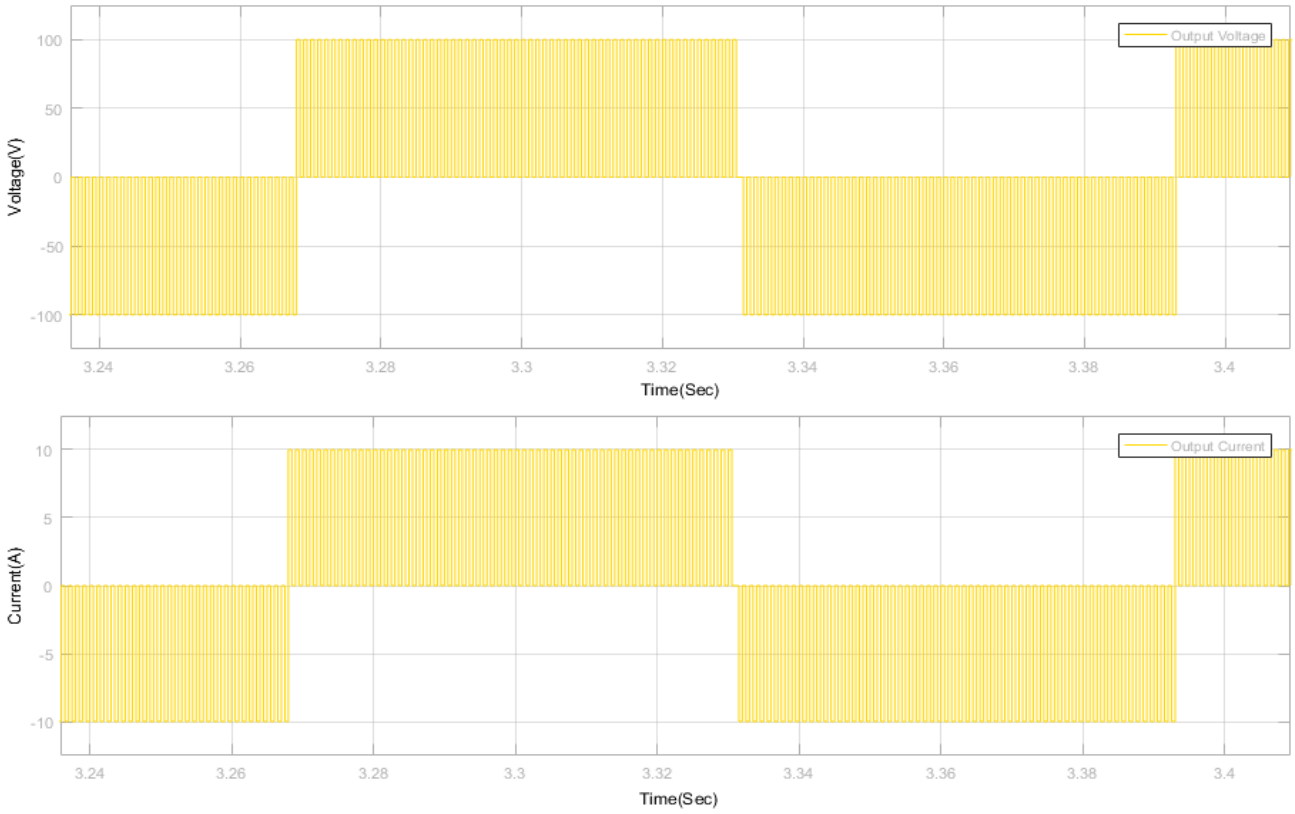

Figure 8.10.: Load Voltage and Current Waveform of Half-Bridge Inverter in Simulink where R = 10 ohm

Circuit-4:

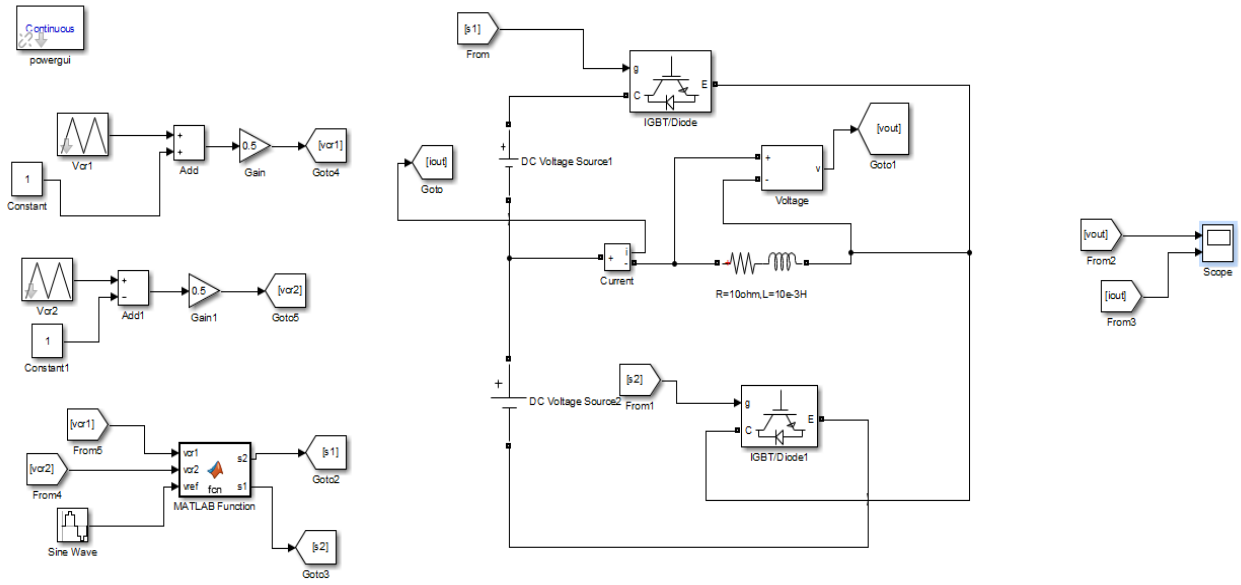

Figure 8.11.: Half – Bridge Inverter Circuit with RL Load where R = 10ohm and L = 10e-3H

MATLAB CODE:

```
function [s2,s1] = fcn(vcr1,vcr2,vref)
% positive half Cycle
if vref>0
    s2 = 0;
    if vref>vcr1
        s1 = 1;
    else
        s1 = 0;
    end
% Negative half Cycle
else
    s1 = 0;
    if abs(vref)>abs(vcr2)
        s2 = 1;
    else
        s2 = 0;
    end
end
```

Output:

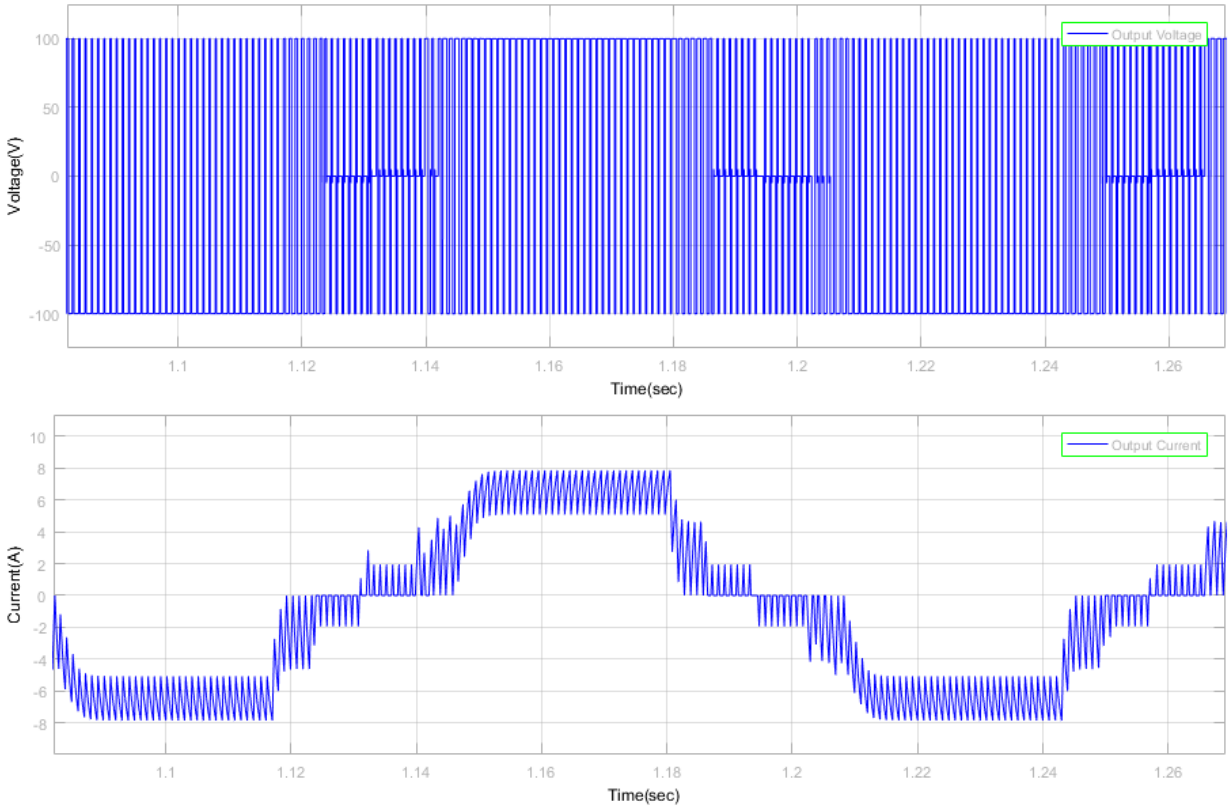

Figure 8.12. Load Voltage and Current Waveform of Half-Bridge Inverter in Simulink where R = 10 ohm and L = 10e-3H

Result and Discussion: In this experiment, DC-AC converter Circuits were designed. H-Bridge Inverter and Half-Bridge or Square Wave Inverter were designed in this experiment in Simulink. All the outputs of the circuits were observed on the scope. It can be seen that the supply dc voltage which was 100V was converted to ac signal thus fulfilling the condition of inverter circuit. Also, the desired results were yielded from the experiment. So it can be said that the experiment was done successfully and the circuits were designed and studied accordingly.